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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,329	04/14/2004	Yeshwanth Narendar	1075-E4371	5396

34456 7590 09/14/2006

LARSON NEWMAN ABEL
POLANSKY & WHITE, LLP
5914 WEST COURTYARD DRIVE
SUITE 200
AUSTIN, TX 78730

EXAMINER	
MALDONADO, JULIO J	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 09/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/824,329	NARENDAR ET AL.	
	Examiner	Art Unit	
	Julio J. Maldonado	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-11 and 14-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-11 and 14-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20060214*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The cancellation of claims 2 and 13 in the reply filed in 07/03/2006 is acknowledged.

2. Claims 1, 4-11 and 14-21 are pending in the Application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4-9, 14-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thilderkvist et al. (U.S. 6,277,194 B1) in view of Kumar et al. (U.S. 2003/0198749 A1).

Thilderkvist et al. teach a semiconductor processing component comprising silicon carbide (SiC), wherein an outer surface of said component consist of a coated layer of SiC, and wherein said coated layer is treated to reduce the amount of contaminants therein, and wherein said SiC component is a SiC reaction chamber component (column 3, line 41 – column 5, line 11).

Thilderkvist et al. fail to teach wherein said coated SiC is a CVD-SiC. However, Kumar et al. teach a semiconductor processing component comprising silicon carbide (SiC) impregnated with silicon (Si), wherein an outer surface portion of the component consist of CVD-SiC, and wherein said CVD-SiC is clean (Kumar et al., [0009], [0023] and [0030]). Therefore, it would have been obvious to one of ordinary skill in the art at

the time the invention was made to combine the teachings of Thilderkvist et al. and Kumar et al. to substitute the coated SiC of Thilderkvist et al. with a CVD-SiC according to the teachings of Kumar et al. because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness. See MPEP 2144.05.

Still, the combined teachings of Thilderkvist et al. and Kumar et al. fail to teach wherein said CVD-SiC has a surface impurity level that is not greater than five times a bulk impurity level. However, the selection of the claimed impurity concentration is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species, and furthermore because both, Thilderkvist et al. and Kumar et al. are directed to a semiconductor component having reduced impurity levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the combined teachings of Thilderkvist et al. and Kumar et al. to arrive at the claimed invention.

The combined teachings of Thilderkvist et al. and Kumar et al. substantially teach all aspects of the invention but fail to disclose wherein the bulk impurity level is measured at a depth of at least 3 μm from an outer surface of the outer surface portion; wherein the CVD-SiC layer has a thickness within a range of about 10 to about 1,000 μm. One of ordinary skill in the art would have been led to the recited dimensions through routine experimentation and optimization. Applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility

using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). See also MPEP 2144.04(IV)(B).

The combined teachings of Thilderkvist et al. and Kumar et al. teach wherein contaminants within the semiconductor components include iron (Fe), copper (Cu) and nickel (Ni), for example (Thilderkvist et al., column 2, lines 31 – 45), but fail to teach wherein the bulk impurity level is not greater than $1x10^{17}$ atoms/ccFe and not greater than $1x10^{15}$ atoms/ccCr. However, the selection of the impurity level range is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species to obtain a desired surface, and furthermore, because Thilderkvist et al. and Kumar et al. are directed to a semiconductor component having reduced metal impurity levels on its surface. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Thilderkvist et al. in view of Kumar et al. to arrive at the claimed invention.

The combined teachings of Thilderkvist et al. and Kumar et al. teach a non-preferred embodiment of the invention wherein the component is machined prior to

treatment to provide said surface impurity level (Kumar et al., [0010]). Although not taught as a preferred embodiment, the combination of Thilderkvist et al. and Kumar et al. teaches this embodiment nonetheless, and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. In re Susi, 169 USPQ 423 (CCPA 1971). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). Even a teaching away from a claimed invention does not render the invention patentable. See Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998), where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed." To further clarify, a prior art opinion that a claimed invention is not preferred for a particular limited purpose, does not preclude utility of the invention for that or another purpose, or even preferability of the invention for another purpose.

5. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thilderkvist et al. (U.S. 6,277,194 B1) in view of Kumar et al. (U.S. 2003/0198749

A1) as applied to claims 1, 4-9, 14-19 and 21 above, and further in view of Bosch (U.S. 6,890,861 B1).

The combined teachings of Thilderkvist et al. and Kumar et al. substantially teach all aspects of the invention including forming the semiconductor component using a sintering process (Kumar et al., [0009], [0023] and [0030]), but fail to disclose wherein said components are formed by a CVD process. However, Bosch teaches silicon carbide components or silicon carbide/silicon components such as liners, process tubes, paddles and boats, formed by either sintering and/or CVD processes (column 3, lines 32 – 38). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Thilderkvist et al. and Kumar et al. to enable the components of Thilderkvist et al. and Kumar et al. to be formed according to the teachings of Bosch because one of ordinary skill in the art at the time the invention was made would have been motivated to look to alternative suitable methods of forming the disclosed components of Thilderkvist et al. and Kumar et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thilderkvist et al. (U.S. 6,277,194 B1) in view of Kumar et al. (U.S. 2003/0198749 A1) and Goldstein et al. (U.S. 5,494,439).

Thilderkvist et al. teach a semiconductor processing component comprising silicon carbide (SiC), wherein an outer surface of said component consist of a coated layer of SiC, and wherein said coated layer is treated to reduce the amount of

contaminants therein, and wherein said SiC component is a SiC reaction chamber component (column 3, line 41 – column 5, line 11).

Thilderkvist et al. fail to teach wherein said coated SiC is a CVD-SiC. However, Kumar et al. teach a semiconductor processing component comprising silicon carbide (SiC) impregnated with silicon (Si), wherein an outer surface portion of the component consist of CVD-SiC, and wherein said CVD-SiC is clean (Kumar et al., [0009], [0023] and [0030]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Thilderkvist et al. and Kumar et al. to substitute the coated SiC of Thilderkvist et al. with a CVD-SiC according to the teachings of Kumar et al. because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness. See MPEP 2144.05.

Still, the combined teachings of Thilderkvist et al. and Kumar et al. fail to teach wherein said CVD-SiC has a surface impurity level that is not greater than five times a bulk impurity level. However, the selection of the claimed impurity concentration is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species, and furthermore because both, Thilderkvist et al. and Kumar et al. are directed to a semiconductor component having reduced impurity levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the combined teachings of Thilderkvist et al. and Kumar et al. to arrive at the claimed invention.

The combined teachings of Thilderkvist et al. and Kumar et al. substantially teach all aspects of the invention but fail to disclose wherein the bulk impurity level is measured at a depth of at least 3 μm from an outer surface of the outer surface portion; wherein the CVD-SiC layer has a thickness within a range of about 10 to about 1,000 μm. One of ordinary skill in the art would have been led to the recited dimensions through routine experimentation and optimization. Applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). See also MPEP 2144.04(IV)(B).

The combined teachings of Thilderkvist et al. and Kumar et al. substantially teach all aspects of the invention but fail to disclose wherein the SiC component is a wafer boat. However, Goldstein et al. (Figs.1-3) teach a semiconductor processing component comprising an ultraclean SiC surface, wherein said outer surface portion of the component is free from metal impurities, wherein said surface is cleaner than an interior bulk of said semiconductor component, and wherein said metal impurities

comprise aluminum, sodium and iron (column 2, line 47 – column 8, line 7), and wherein said component may include boats, cantilevers, tubes, liners, pedestals and pins (column 3, lines 2 – 4).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Thilderkvist et al. and Kumar et al. to enable the components of the reaction chamber of Thilderkvist et al. and Kumar et al. according to the teachings of Goldstein et al. because one of ordinary skill in the art at the time the invention was made would have been motivated to look to alternative suitable components in Thilderkvist et al. and Kumar et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

Response to Arguments

7. Applicant's arguments filed 07/03/2006 have been fully considered but they are not persuasive.

Applicants argue, "...While Thilderkvist et al, evidently teaches the partial purification of an outer surface portion era processing chamber for semiconductor manufacture, the process of Thilderkvist et al., cannot possibly result in the level of purity as presently claimed. Particularly, the disclosure of Thilderkvist et al. is principally focused upon removal of contaminants following a known contamination process, such as metal contamination during packaging or handling with metal parts or tools. See paragraph bridging columns 6 and 7 of Thilderkvist et at. Thilderkvist et al. does not disclose or even remotely recognize the intrinsic impurity spike of the surface of an as-deposited CVD-SiC film. As noted above, this intrinsic spike is generally at least 100X

and ranging up to 1000X the level of impurities in the bulk of the component. The claimed invention achieves hobble impurity reduction through a removal process, in which a portion of the CVD-SiC material is removed. In contrast, Thilderkvist et al. merely teaches a diffusion process, and not removal of an outer surface portion that is rich in impurities. Based upon the teaching of Thilderkvist et al., Applicants submit that the sacrificial layer formation and impurity diffusion, cannot possible result in 1000X, let alone 100X reduction in impurity levels to achieve an outer surface having an impurity level not greater than 2X a bulk impurity level, enabled by an oxidation removal process...".

In response to this argument, the claimed invention is directed to a semiconductor component, not on a process of manufacturing a semiconductor component and the patentability of a product does not depend on its method of production. Furthermore, the claims recite, "...the surface impurity level is not greater than 2 time a bulk impurity level...", not a component having an intrinsic spike that is "generally at least 100X and ranging up to 1000X the level of impurities in the bulk of the component" as argued.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Applicants are encouraged, where appropriate, to check Patent Application Information Retrieval (PAIR) (http://portal.uspto.gov/external/portal/pair) which provides applicants direct secure access to their own patent application status information, as well as to general patent information publicly available.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax number for this group is 571-273-8300. Updates can be found at http://www.uspto.gov/web/info/2800.htm.

Julio J. Maldonado
Patent Examiner
Art Unit 2823

Julio J. Maldonado
September 4, 2006

George Fourson
Primary Examiner